

WHAT IS CLAIMED IS

1. A suspension for a vehicle comprising:

a wheel-in motor which is equipped with a motor
provided in a wheel and an output shaft of the motor

5 rotating with the wheel, and

an arm for suspending a car body, wherein

one end of the arm is fixed to the car body with a
pivot to perform a swing motion in the longitudinal
direction of the car body, another end of the arm is
10 connected to the output shaft of the motor so as to
rotate relatively to the output shaft.

2. The suspension according to Claim 1,

further comprising a swing control mechanism for
controlling the swing motion of the arm during
15 traveling of the car.

3. The suspension according to Claim 1,

further comprising a spring and a damper for
absorbing vibration transmitted to the car body via
the wheel-in motor and the arm, wherein the damper has
20 a function for controlling the swing motion of the arm.

4. The suspension according to Claim 1, wherein

a damper and a spring for a shock absorber is
provided at the pivot of the arm;

the spring is a coil spring, which is arranged

25 around the pivot so as to be twisted against the swing

motion of the arm.

5. The suspension according to Claim 1, wherein
a damper and a spring for a shock absorber is
provided at the pivot of the arm;

5 the spring is a coil spring, which is arranged
around the pivot so as to be twisted against the swing
motion of the arm; and

a load of the spring is applied adjustably
beforehand with a spring load adjusting mechanism.

10 6. The suspension according to Claim 1, wherein a
damper and a spring for a shock absorber is provided
between the arm and the car body.

7. The suspension according to Claim 1, wherein
the wheel has a built-in brake unit driven by an
15 electric signal.

8. The suspension according to Claim 1, further
comprising a wheel speed sensor for detecting a wheel
speed, an arm angle sensor for detecting an angle of
the arm, a torque sensor for detecting torque of the
20 motor, and a body angle sensor for detecting a tilt of
the car body.

9. A vehicle control method comprising:
using each suspension having the arm and the
wheel-in motor in any one of Claims 1 to 8 as an
25 independent suspension system of a car body;

controlling a posture of the car body during
traveling of the car by at least controlling a
revolution speed and a torque of each wheel-in motor
of front wheels and rear wheels, and controlling the
5 swing motions of the arm of each suspension of front
wheels and rear wheels in the longitudinal direction
of the car body.

10. The vehicle control method according to Claim
9, wherein a posture of the car body is controlled
10 during traveling of the car by controlling a response
of the swing motion of each arm according to a state
of a road surface, and by controlling an angle of the
arm by controlling the revolution speed and the torque
of each wheel-in motor.

15 11. The vehicle control method according to Claim
9, wherein during traveling of the car, (1) when the
height on the front side of the car body is to be
lowered, the revolution speed and the torque of the
wheel-in motors on the front wheel side are made
20 larger than those of the wheel-in motors on the rear
wheel side, and (2) when the height on the rear side
is to be lowered, the revolution speed and the torque
of the wheel-in motors on the rear wheel side are made
smaller than those of the wheel-in motors on the front
25 wheel side, and (3) when the car height on the front

side is to be increased, the revolution speed and the torque of the wheel-in motors on the front wheel side are made smaller than those of the wheel-in motors on the rear wheel side, and (4) when the height on the rear side is to be increased, the revolution speed and the torque of the wheel-in motors on the rear wheel side are made larger than those of the wheel-in motors on the front wheel side.

12. The vehicle control method according to Claim 9, wherein during traveling of the car, (1) when the height of either of the left and right sides of the car body is to be lowered, the revolution speed and the torque of the front wheel-in motor on the side of the height to be lowered are made larger than the revolution speed and the torque of the front wheel-in motor on the side of the height not to be lowered, and the revolution speed and the torque of the rear wheel-in motor on the side of the height to be lowered are made smaller than the revolution speed and the torque of the rear wheel-in motor on the side of the height not to be lowered, and

(2) when the height of either of the left and right sides of the car body is to be increased, the revolution speed and the torque of the front wheel-in motor on the side of the height to be increased are

made smaller than the revolution speed and the torque of the front wheel-in motor on the side of the height not to be increased, and the revolution speed and the torque of the rear wheel-in motor on the side of the height to be increased are made larger than the revolution speed and the torque of the rear wheel-in motor on the side of the height not to be increased.

13. A vehicle control apparatus comprising:

a wheel-in motors which is provided in each wheel of front and rear wheels and has an output shaft rotating with the wheels;

an arm of each one of front and rear suspensions for suspending a car body, wherein one end of the arm is fixed to the car body with a pivot to perform a swing motion in the longitudinal direction of the car body, another end of the arm is connected to the output shaft of the motor so as to rotate relatively to the output shaft; and

an arm angle control unit for controlling a revolution speed and a torque of each wheel-in motor to control an angle of the arm..

14. The vehicle control apparatus according to Claim 13, further comprising a control mechanism for controlling a response of the swing motion of the arm, and when controlling an angle of the arm, the

response of the swing motion are controlled to be more rapid than usual traveling.

15. 1. A suspension for a vehicle comprising:

5 a wheel-in motor which is equipped with a motor provided in a wheel and an output shaft of the motor rotating with the wheel, and

an arm for suspending a car body, wherein

10 one end of the arm is fixed to the car body with a pivot to perform a swing motion in the longitudinal direction of the car body, another end of the arm is connected to the output shaft of the motor with at a bearing mechanism.